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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,896	03/26/2004	Yoshio Takasu	70728-011	7805

7590 08/20/2007  
MCDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
WASHINGTON, DC 20005-3096

EXAMINER
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ZIMMER, ANTHONY J

ART UNIT	PAPER NUMBER
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1709

MAIL DATE	DELIVERY MODE
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08/20/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/809,896

Applicant(s)

TAKASU ET AL.

Examiner

Anthony J. Zimmer

Art Unit

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 5 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 3/26/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Status of Application***

1. Claims 1-12 are pending and are subject to examination.

### ***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Japanese Application No. 2003-092872, filed on 28 March 2003.

### ***Information Disclosure Statement***

3. The references disclosed in the information disclosure statement filed on 26 March 2004 were considered, and a signed copy is enclosed.

### ***Claim Objections***

4. Claim 5 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent cannot refer to another multiply dependent claim. Multiply dependent claim 5 cannot refer to multiply dependent claim 3. See MPEP § 608.01(n).
5. Claim 7 is objected to because of the following informalities. Appropriate correction is required. In part (a) and part (b) "layered alkaline metal-ruthenate

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compound" is referred to when previously in the claim "alkali metal" compounds were referred to. Correction of "...alkaline metal..." to "...alkali metal..." is suggested.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. The term "smaller" in claims 1 and 7—part (a) and 7 part (b)—is a relative term which renders the claims indefinite. The term "smaller" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The thickness of the nanosheet in each of the claims is rendered indefinite because of the use of the term "smaller". All of the dependent claims of claims 1 and 7 (2-6 and 8-12 respectively) are rejected, as they are rendered indefinite by the use of the term "smaller" in parent claims 1 and 7.

9. Claim 5 is rejected, as one of ordinary skill in the art would not be reasonable apprised of the scope of claim 5. The invention is not distinctly pointed out, as it claims

(i) a colloidal ruthenic acid compound containing the ruthenic acid nanosheet in accordance with claim 1

and/or

(ii) the layered ruthenic acid compound in accordance with claim 3 and a solvent.

When using "and" it is unclear if (i) and (ii) are together as a mixture, slurry, in the same room, etc. Therefore claim 5 is rendered indefinite.

### ***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-6 are rejected under 35 U.S.C. 102(b) as anticipated by Takasu et al, see PTO-892.

Claim 1 is drawn to a ruthenic acid nanosheet having a thickness of less than 1 nm. Takasu et al (hereafter, Takasu) describes a process for making a layered ruthenium oxide compound by melting ruthenium oxide and potassium hydroxide at 600°C, see Takasu section 3.5. Although Takasu does not explicitly mention a ruthenic acid nanosheet having a thickness of 1 nm or smaller, it necessarily flows from the given process and one of ordinary skill in the art would have envisaged at the time of the invention that the product of the process of Takasu contains a ruthenic acid nanosheet with a thickness of less than 1 nm.

In claim 9 (referring to claim 7 part (a)) applicant describes an identical process to that of Takasu in which an alkali metal hydroxide and ruthenium oxide are melted at 500°C - 700°C to form a ruthenic acid nanosheet with a thickness of less than 1 nm. Hereafter, this process as described in claim 7 part (a) and further limited in claim 9 will be referred to as the "nanosheet forming process." Takasu admits that the compound formed in the process described in Takasu has a layered structure that has not yet been well characterized, see section 3.5 of Takasu. However, a product of the nanosheet forming process is characterized on page 20-21 in the instant application and is found to have ruthenium oxide nanosheet(s) with a thickness of less than 1 nm, see page 21 lines 14-16 and claim 9. Since the process of Takasu is identical to the nanosheet forming process of instant application, one of ordinary skill in the art at the time of the invention would have envisaged that Takasu necessarily produces a product containing ruthenic acid nanosheets with a thickness of less than 1 nm.

Claim 2 is drawn to the ruthenic acid nanosheet in accordance with claim 1 represented by the formula  $[\text{RuO}_{2+0.5x}]^{x-}$ . Takasu describes the product of the nanosheet forming process having a formula of  $\text{K}_x\text{RuO}_y$  which is the same formula as  $[\text{RuO}_{2+0.5x}]^{x-}$  in an alternative representation, see Takasu section 3.5. Also, since the process of Takasu is identical to that of the nanosheet forming

process of the instant application, one of ordinary skill in the art would have envisaged at the time of the invention that the nanosheets formed in Takasu would necessarily have the same chemical formula.

Claim 3 is drawn to a layered ruthenic acid compound comprising a layered structure of the ruthenic acid nanosheets in accordance with claim 1 or 2. Takasu describes forming the compound  $K_xRuO_y$  with a layered structure that one of ordinary skill in the art would have envisaged at the time of the invention to contain ruthenic acid nanosheets as described above, see Takasu section 3.5, first paragraph, lines 2-5.

Claim 4 is drawn to the layered ruthenic acid compound in accordance with claim 3 having an X-ray diffraction peak intensity at a (00L) plane ( $L = 1$  to  $n$  when  $0 \leq \theta(CuK\alpha) \leq 90^\circ$ ,  $n$  is determined depending on a basal interplanar spacing and  $5 \leq n \leq 35$ ). The instant application characterizes the product of the nanosheet forming process and finds an X-ray diffraction peak intensity at a (00L) plane ( $L = 1$  to  $6$  when  $0 \leq \theta(CuK\alpha) \leq 90^\circ$ , see figure 3. Since the process of Takasu is identical to that of the nanosheet forming process of the instant application, one of ordinary skill in the art would have envisaged at the time of the invention that

the product formed in Takasu would necessarily have the same X-ray diffraction pattern.

Claim 5 is drawn to a colloidal ruthenic acid compound containing the ruthenic acid nanosheet in accordance with claim 1 and/or the layered ruthenic acid compound in accordance with claim 3 and a solvent. Takasu describes a process of adding the  $K_xRuO_y$  described above (a layered ruthenic acid compound) to an aqueous solution of HCl (a solvent), see Takasu section 3.5.

Claim 6 is drawn to an electrochemical device having an electrode comprising the ruthenic acid nanosheet in accordance with claim 1. Takasu teaches making an electrode from  $H_xRuO_y$ , (a compound containing the ruthenic acid nanosheets as described above) by coating the compound on a titanium sheet with a PTFE dispersion, thereby forming an electrochemical device having an electrode, see Takasu section 3.5.

Therefore claims 1-6 are rejected as being anticipated by Takasu et al.



***Allowable Subject Matter***

12. Claims 7-12 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

13. The following is a statement of reasons for the indication of allowable subject matter: This application sets forth a novel process for the production of a ruthenic acid nanosheet. Claim 7 teaches a process involving steps of:

- (a) mixing ruthenium oxide and an alkali metal compound and sintering or melting
- (b) treating the product of part (a) with an acidic solution
- (c) reacting the product of part (b) with ammonium or alkylamine (an intercalation compound)
- (d) mixing the product of part (c) with a solvent to obtain a colloid.

Prior art (Takasu, see PTO-892) describes a process of combining ruthenium oxide and potassium hydroxide (an alkali metal compound) and treating the product with an acidic solution (steps (a) and (b) above), but fails to teach parts (c) and (d). No prior art on record was found to indicate obviousness or lack of novelty. Claims 8-12 further limit this process and are thus also novel.

***Conclusion***

In sum, claims 1-12 are rejected and no claim is allowed.

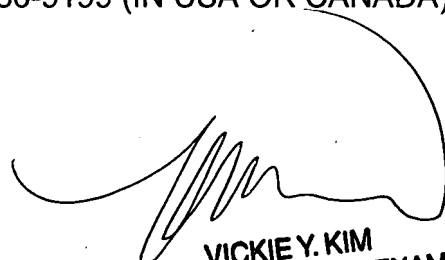
**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Zimmer whose telephone number is 571-270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ajz



**VICKIE Y. KIM**  
**SUPERVISORY PATENT EXAMINER**